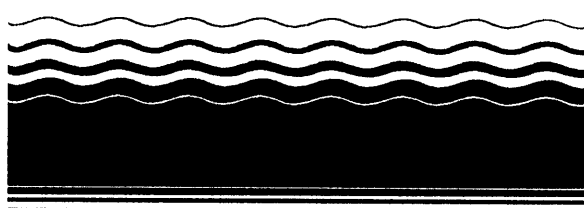




SITE

**SUPERFUND INNOVATIVE
TECHNOLOGY EVALUATION**



Demonstration Bulletin

Microfiltration Technology

EPOC Water, Inc.

Technology Description: The EPOC microfiltration technology is designed to remove suspended solids that are 0.1 microns in diameter or larger from liquid wastes. Wastewaters containing dissolved metals are treated by chemical precipitation, so that the metal contamination present is greater than or equal to 0.1 microns. The precipitated metals, along with all other particles down to 0.1 microns, are filtered through a fabric crossflow microfilter (EXXFLOW). The concentrate stream is then dewatered in an automatic tubular filter press of the same fabric material (EXXPRESS). Figure 1 presents a schematic of EPOC's microfiltration system.

The EXXFLOW microfilter modules consist of an array of parallel permeable textile tubes which are enclosed in an outer tube shell. Liquid wastes are pumped into the microfilter tubes, and suspended matter in the liquid feed forms a membrane layer on the internal surface of each tube. The membrane formed is dynamic, continually formed and swept clean by the longitudinal flow of the feed liquid through the tubes. Dynamic membranes of widely different characteristics can be produced by using different pretreatment chemicals. Permeate, or treated product liquid, filters radially through the membrane layer and out of the textile tube walls for collection in the outer tube shell. The EXXFLOW concentrate stream is discharged to the EXXPRESS feed tank.

The EXXPRESS portion of the process dewateres the sludge from the EXXFLOW concentrate. During operation, the discharge valve of the EXXPRESS remains closed as the concentrate stream enters the module. A layer of solids forms on the inside of the tubular cloth of the EXXPRESS tubes similar to that of the EXXFLOW module. While in the dead-end mode, the system builds pressure and the associated water permeates through the slurry membrane layer. The water is collected and recycled back to the EXXFLOW feed tank. When the membrane layer reaches a controlled thickness, the discharge valve is opened and the module is traversed by mechanical squeeze rollers. The rollers separate the membrane layer from the tube wall to form solid chips (filter cake). The cake is expelled from the tubes with flush water and the solids are separated from the liquid with a gravity dewatering screen. The discharge water is recycled back to the EXXPRESS feed tank.

In cases where the solids in the liquid feed are extremely high, EXXPRESS can be used first, with EXXFLOW acting as a final polish for the product water.

Waste Applicability: This technology is applicable to wastewaters containing heavy metals, pesticides, oil and grease, suspended solids,

and constituents that can be precipitated into particle sizes greater than 0.1 microns. The system can handle waste streams containing 2% to 5% solids.

Demonstration Results: A demonstration of the EPOC Water, Inc. transportable, skid-mounted, pilot-scale Microfiltration Technology (2 to 7 gpm) has been performed under the Superfund Innovative Technology (SITE) Program. The demonstration occurred during May and June of 1992 at the Iron Mountain Mine Superfund site, located near Redding, California.

During the Demonstration Test, the EPOC Microfiltration Technology treated heavy metal contaminated acid mine drainage from the Old Number 8 mine seep. The primary chemical composition of Old Number 8 was approximately:

- 700 ppm aluminum;
- 0.5 ppm cadmium;
- 170 ppm copper;
- 1900 ppm copper;
- 7000 ppm sulfate;
- 60 ppm zinc; and
- pH 2 - 2.5

For each of the Demonstration Tests, different alkalies (treatment chemicals) were used to precipitate the metals from solution. These alkalies included:

- Hydrated Lime (calcium hydroxide, Ca(OH)_2);
- Sodium Hydroxide (50% liquid caustic soda, NaOH); and
- Magnesium Oxide (MgO).

Developer claims for metal removals on Old Number 8, when neutralizing with NaOH and Ca(OH)_2 , were generally met or exceeded except for aluminum. This was most likely due to the difficulty encountered when using NaOH and Ca(OH)_2 to control the pH of this waste stream. The claims for all metals, including aluminum, were exceeded when MgO was used as the neutralizing agent. In most cases, there were no detectable concentrations of heavy metals in the permeate samples.

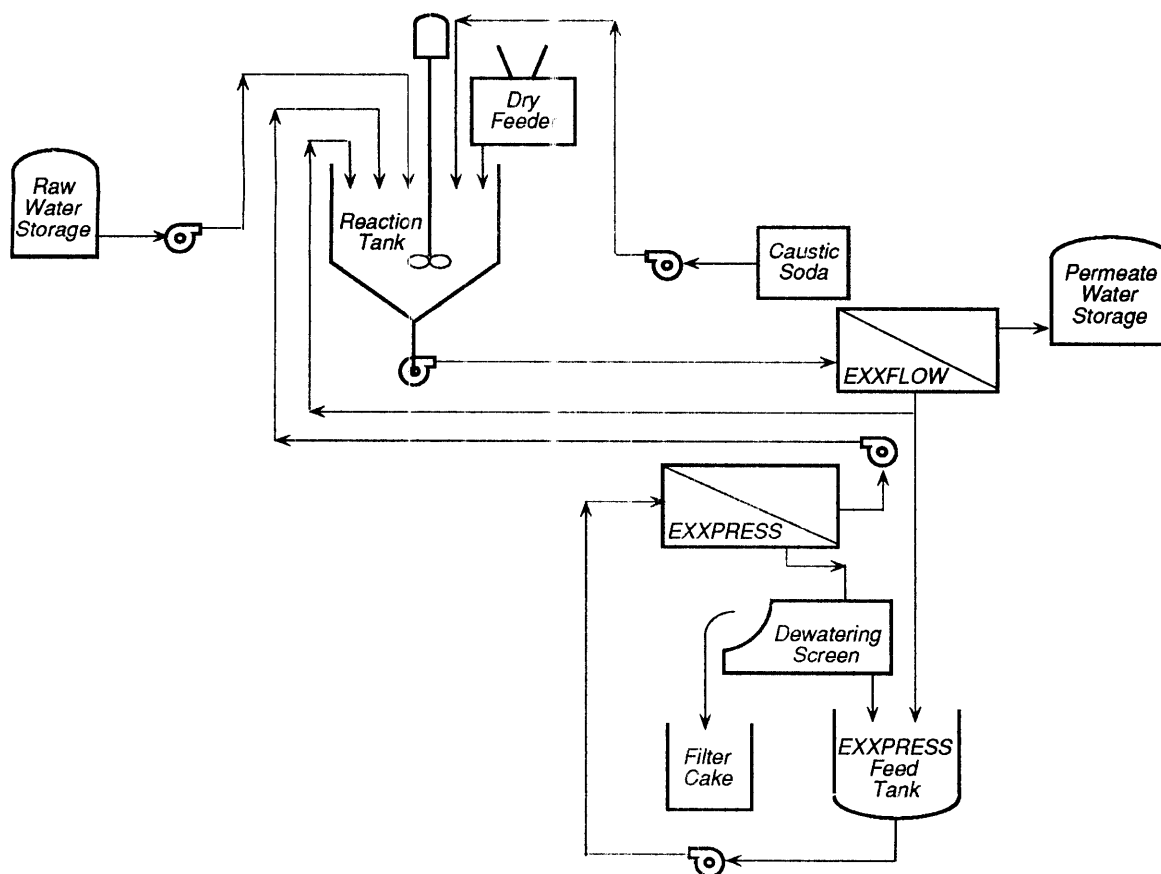
Filter cake produced from the Demonstration Test contained approximately 12%, 31% and 30% solids when NaOH , Ca(OH)_2 , and MgO were used as the treatment chemicals, respectively. TCLP leaching tests performed on the filter cake showed that leachable levels of TCLP metals were below the regulatory limits for each of the treatment chemicals tested.



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